Title: Starting a Restaurant

Brief Overview:

Have you ever wondered what it would be like to start your own restaurant? Well, it can be a difficult process because there is a lot of data to sort through. In this unit, second and third graders will be exposed to using tally charts and bar graphs as a means of organizing and displaying data. The students will be chefs-in-training and work on all aspects of starting a restaurant. They will determine what type of restaurant to start, vote on a name, organize kitchen supplies, keep track of new recipes, and help to create an amazing menu. At the end of the unit students will submit their business proposal to the Head Chef (the teacher) by completing the summative assessment. Prior to starting this unit students should be able to count to 20, sort materials by like attributes, skip count by 2s and 5s, and they should have previous exposure to tally charts. This is an engaging unit that will challenge students to organize data, create displays, and interpret their data in new, fun, and exciting ways!

NCTM Content Standard: Data Analysis and Probability

- Sort and classify objects according to their attributes and organize data about the objects
- Represent data using concrete objects, pictures, and graphs
- Compare different representations of the same data and evaluate how well each representation shows important aspects of the data
- Describe parts of the data and the set of data as a whole to determine what the data show

Grade/Level:

Grades 2-3

Duration/Length:

3, 60 minute lessons

Student Outcomes:

Students will:

- Collect and organize data using a tally chart
- Create a single bar graph to display data
- Interpret data contained in single bar graphs using a variety of categories and intervals of 1, 2, and 5

Materials and Resources:

Day 1
- Student resource "Pre-Assessment Mixed Fruit"
- Student resource "Pre-Assessment Organized Fruit"
- Student resource "Chef-in-Training Badges"
- Tape or safety pins to attach the badges
- Chef's hat and apron for the teacher
- Student resource "New Castle City Map"
- Teacher resource "New Castle City Map Answer Key"
- Large piece of chart paper and marker
- Student resource "Scattered Supplies"
- Teacher resource "Scattered Supplies Answer Key"
- Student resource "Exit Ticket Tally Marks"

Day 2
- Student Resource "Base Ten Tally Sheet"
- Student supply bags- base ten blocks, 2 tens sticks and 35 ones cubes, per group
- Student resource "Scattered Supplies Bar Graph"
- Crayons, 4 different colors per group
- Scissors, 2-3 per group
- Glues sticks, 1 per group
- Student resource "Remember TAILS" poster
- Teacher resource "Scattered Supplies Bar Graph Answer Key"
- Student resource "Name that Restaurant"
- Student resource "Exit Ticket Restaurant Name"

Day 3
- Student resource "Which Is Correct?" activity page
- TAILS poster from day 2 (teacher copy).
- Student resource "Questioning a Bar Graph"
- Teacher resource "Questioning a Bar Graph Answer Key"
- Student resource "Amazing Menu"
- Teacher resource "Amazing Menu Answer Key"
- Student resource "Business Proposal" assessment
- Teacher resource "Business Proposal Answer Key"

Development/Procedures:
Day 1
Pre-assessment/ Engagement Activity- Why is it important to organize data?
- Randomly distribute two different ways of organizing data face down on the students' desks (Student resources "Pre-Assessment Mixed Fruit" and "Pre-Assessment Organized Fruit"). One page will have several pictures of food randomly displayed on a page and the other page will have the same information

displayed in a tally chart (half the class should get page 1 and the other half should get page 2).

- Tell the students that they cannot look at the page until you say it is okay because you want everyone to shout out the answers at the same time.
- Once everyone has the sheet, have the students quickly look at their data and ask how many apples, oranges, bananas, and grapes are represented.
- The students with the tally chart (page 2) should be able to answer quickly, so as soon as you hear the correct answer, move on to the next question (the activity is meant to go quickly and confuse those students who received page 1).
- Now explain that some people had different sheets and show everyone the two different activity pages. Ask them which set of data was easier to understand and have them explain their thinking.
- Discuss whether the information is the same on both pages. Prove it by counting the fruit on the random page and comparing it to the tally marks.
- Explain why it is important for us to organize data (have students list some ideas about why organizing data is important).
- (If available, wear a chef's hat and apron). Explain to the students that they are going to be starting up a restaurant, but before they can get their restaurant running they need to collect, organize and display a lot of different data. Distribute the chef-in-training badge to each student and allow them to put their name on it.

Exploration/Explanation

- The first task is to decide what type of restaurant to start. This question should be displayed on the board as the focus of the next activity. Ask the students leading questions: "Do you want a restaurant like everyone else's or do you want something different?" Have students explain their answers.
- Explain that they will be looking at a map of their neighborhood in New Castle City to see what types of restaurants are in the neighborhood.
- Distribute the map found on student resource "New Castle City Map" and have the students work with a partner to count the number of Burger Heaven restaurants. Elicit answers from the students. If there is a discrepancy in answers among the students, have the students number the restaurants as they go and/or cross them out to make sure they are not counted twice. You may reference the answer key provided.
- Explain that they are going to use tally marks to represent this data. Practice the "TALLY HAND METHOD" Have the students hold up their right hand. As they count, they should put one finger down (one, two, three, four). and instead of saying five we will say "slash" and put our thumb across the other fingers.
- Practice several times. Students will show the tally marks with their fingers while you draw them on the board. Everyone should be chanting "one, two, three, four, slash" as they go through the motions.
- Model how to represent the total number of Burger Heavens on the tally chart at the bottom of their map. Have a large piece of chart paper with a tally chart on it to model the process of recording data on a tally chart.

- Repeat this process with the Taco Worlds, Pizza Parlors, and Pasta Palaces on their maps. Allow volunteers to draw the appropriate number of tally marks on the large class chart. All the other students can help by saying "one, two, three, four, slash" and air draw the tally marks as they are added to the class chart.
- Once all the restaurants have been counted and tallied, have the students think-pair-share to decide which of the four types of restaurants they should start and have them justify their answers.
- As a class, agree to start a Pasta restaurant because there is only one Pasta Palace in our neighborhood.

Application
- Present the following scenario to the class. Say: "I ordered a whole bunch of supplies for your brand new restaurant, but the delivery man was kind of clumsy and he tripped and dumped the whole box of supplies all over the kitchen floor. I need the help of all my chefs-in-training to organize this mess of scattered supplies!
- Distribute the student resource "Scattered Supplies." Students will work with their partners to count and tally all of the supplies on the worksheet.
- Monitor student progress with the assigned task and assist when necessary. An answer key is provided.
- Early finishers can complete the enrichment extension of this activity.
- After sufficient time review the totals for each supply.
- Save the students' tally sheets for tomorrow's activity.

Differentiation

Reteach
Students who have trouble correctly counting the number of items should number each of the same items and/or cross them off after they have been counted.

Enrich
Students who finish early with the scattered supplies activity can determine the amount of supplies if each picture represented 2 items. Students can create a tally chart showing this data. Ask: "What would happen if each picture represented 5 items?" Students can create a tally chart showing this data.

Assessment
- Distribute student resource "Exit Ticket Tally Marks" and have the students tally the number of boys and girls in the class today.
- Collect the chef-in-training badges for use tomorrow.

Day 2
Engagement
- Place students in groups of two or three. Distribute a chef-in-training badge to each student.

- Each group will need a bag of base ten blocks, (2 tens sticks and 35 ones cubes), their student resource "Scattered Supplies" tally sheet from yesterday, and the student resource "Base Ten Tally Sheet" for this activity.
- Tell the students that they did an amazing job of organizing their supplies into a tally sheet yesterday. Today they are going to organize their data using a different way. Have students work with their groups to represent the number of tally marks for each of the four supplies using their base ten blocks (EX. The mug had six tally marks so the students should place six ones cubes in the mug section of the "Base Ten Tally Sheet").
- After allowing sufficient time have students model strategies that they used to decide the number of cubes to put in each section.

Exploration
- Distribute the student resource "Scattered Supplies Bar Graph" to each group and four different colored crayons. Also distribute 2 pair of scissors and glue sticks for each group as they will need this later in the lesson (Explanation TAILS activity).
- Read the directions for the activity. The students will place the cubes from their "Base Ten Tally Sheet" on the graph, one cube in each square. The mug cubes will go in the mug column, the utensils with the utensils, etc. Upon completion of the task, they should raise their hands and have their work checked. Then they can color in each of the squares where they had placed a cube. Remind them that each column should have a different color.
- Allow students time to complete the activity. You can assist as necessary. An answer key is provided.

Explanation
- Explain that the students have started to make a bar graph and that bar graphs are one way to organize and represent data. Tell the students that all bar graphs have special parts and to help them remember they are going to learn about TAILS, an acronym. Display the covered TAILS poster on the board and uncover each section as it is introduced.
- Tell the students that T stands for title. Ask them what the purpose of a good title is. Have them brainstorm a good title for their graph (Ex. Number of Supplies in the Kitchen). Have the students write the title they select in the correct section on the bar graph.
- Explain that the next letter is A and this stands for axis. These axes are the horizontal and vertical lines on the bar graph. Have the students point to the horizontal and vertical axes.
- The next letter is I and this stands for interval. The interval is shown by the numbers on the vertical axis of the graph. Have the students look at their graphs and determine what each square represents (one cube). Have the students cut out the numbers on the bottom of their page and label the vertical access with an interval of 2 (0, 2, 4, 6, 8, 10). by lining up the line on the number card with the line on the graph. NOTE: On the graph you will see that there are darker lines to help the students label the intervals correctly. Please make sure they label the **line** and not the **space**.

- The L in TAILS stands for label. It is important to label the horizontal and vertical axes so that we can tell what the graph shows. Have them cut out the labels at the bottom of their pages and paste the horizontal axis "Kitchen Supplies" and the vertical axis "Number of Supplies" on their graphs.
- Finally, the S in TAILS stands for spaces. Show the students how they already filled in the spaces correctly by coloring in the correct number of squares.
- Distribute the student copy of the TAILS poster for the students to use as a reference during the next activity. Review quickly what each of the letters stand for and have them point to each section of their "Scattered Supplies Bar Graph."

Application
- Explain the next activity. Say: "Chefs-in-training, today we are going to decide on a name for our restaurant! I have been thinking long and hard and I have come up with four really cool names, but I need your help to choose the best one." Distribute student resource "Name That Restaurant" and read through the four names at the bottom: SISI's Pasta, Lotsa Pasta, Lasagna Lizard, and More Cheese Please.
- The class should vote on which name they like the best and record the data as a tally chart at the bottom of the page. Remind each student that they may only vote once (Do not specifically state which name won the vote, because students willanswer that question as a reflection at the end of the activity). NOTE: You can control the data to make the numbers even or odd based on the level of difficulty needed for the class (Remember you can vote too!). The scale of this bar graph will also use intervals of 2. Classes that need more of a challenge should use odd numbers that will fall in between the labeled intervals.
- After the class has collected the data on the tally chart, read over the directions with the students and allow them to create the bar graph above using TAILS. Remind them that they should use an interval of 2 just like we used on the "Scattered Supplies Bar Graph."
- After they have finished, have them point to the different sections of TAILS on their own graphs to show they understand the different components of the bar graph.
- When they are finished, they can turn in their "Name That Restaurant" resource sheet and complete the exit ticket for the day.

Differentiation

Reteach
If students are having difficulty identifying the numerical value of each bar have a number line available to help them identify what comes between 0-2, 2-4, 4-6, 6-8, 8-10, and 10-12.

Enrich
Students who need an added challenge can use an interval of 5 on their graph to represent their data. Have a few copies of the "Name That Restaurant" blank bar graph ready for them.

Assessment
- Distribute a copy of student resource "Exit Ticket Restaurant Name" to each student. Students will answer the following questions: What did the class decide to call the new restaurant? How do you know this name was chosen? (The students should correctly identify the name that received the most votes and point out that it had the most tally marks or the highest bar to justify their answer).
- Collect the chef-in-training badges and save them for tomorrow's lesson.

Day 3
Engagement
- Distribute the chef-in-training badges and yesterday's "Name That Restaurant Bar Graph."
- Ask the students what information they can learn from interpreting their bar graph. Have them pose questions or volunteer information they can determine (Ex. How many people liked the name SISI's Pasta? How many more people liked _____ than _____? Which name got the most votes? Which name got the least votes? How many people voted?).
- As a class, answer these questions and any others that the students share.
- Say: "WOW chefs! This bar graph can tell us a lot of information. Today you are going to collect more data for your restaurant. Let's get started!"

Exploration
- Put students into groups of two and distribute the student resource "Which Is Correct?" activity page.
- Explain that their restaurant asked four very famous chefs, Colonel Sanders, Ranger Rick, General Jack, and Captain Ray to create some delicious recipes to put on the menu.. We know how many recipes they each created because of the tally sheet, but we are not sure which bar graph shows the data correctly. As chefs-in-training, they need to look at the data and decide which bar graph is correct.
- Allow the students to look at the four graphs on the worksheet and decide with their partner which graph is correct and circle it.

Explanation
- Tell students that when they look at a new bar graph, the first thing they need to do is label the graph using TAILS. Using a projection device, model how to label the five parts of TAILS on the bar graph they circled.
- Also display the list of questions found on student resource "Questioning a Bar Graph." As a class, determine ways to answer the first five questions in the "Which Is It?" section. Show the students how to determine the value of each of the bars, and label each of the bars with that value. Have the students provide the correct answers at the bottom of their pages.
- Practice answering the same questions using the other three graphs on the page.

Application- Amazing Menus

- Tell students: "All right chefs, you are getting to be experts at understanding bar graphs, so you can now create an amazing menu for your restaurant!" Distribute copies of student resource "Amazing Menu" to each student. "I have surveyed several people in the neighborhood about which recipes to include and I now know the top four foods you are going to serve. They are lasagna, spaghetti and meatballs, macaroni and cheese, and chicken parmesan."
- Have the students use the tally mark data to create the "Amazing Menu Bar Graph" and answer the remaining questions on their student resource "Questioning a Bar Graph."
- After students have completed the task, have one student from each group explain how they answered the questions. An answer key is provided.

Differentiation

Reteach
Students who are having difficulty determining the height of the bars, mayuse a ruler to draw a line over to the vertical axis. Also have a number line available to determine what number comes in between the intervals.

For students who are have difficulty labeling TAILS, allow them to use the TAILS poster for a reference.

For students who are struggling with answering the questions, have them underline what the question is asking about to help them focus on the specific information they need.

Enrich
For students who need a greater challenge, have them add another section to their bar graph for the menu item, salad, which 15 people like. This will require them to extend the interval on the vertical access, add a new bar to the horizontal access, and will change the answer to their questions.

Assessment
- Explain that in order to get their restaurant started, the chefs-in-training will need to prove that they have the skills needed to open the restaurant.
- Distribute the student resource "Business Proposal" assessment and read the directions with the students. An answer key is provided.
- Allow students to complete the assessment independently.
- Early finishers can create a menu for the restaurant or write a story about their opening day.

Types of Questions on the Assessment	Points
Question 1: Organize the information using a tally chart	1pt
Question 2: Use a tally chart to create a bar graph	1pt (TAILS), 1pt correct data
Question 3: Which bar has the most? Interpret bar graph	1pt
Question 4: Which bar has the least? Interpret bar graph	1pt

Question 5: How much more? Interpret bar graph	1pt
Question 6: How much less? Interpret bar graph	1pt
Question 7: How many counted? Interpret bar graph	1pt
Question 8: BCR- Complete and interpret bar graph	2pts (part A/ part B)
Total	10pts

Summative Assessment:

The summative assessment for this unit is designed so students can demonstrate their ability to create and interpret tally chars and bar graphs with selected response questions and constructed response questions. Students need to correctly answer 8 out of the 10 questions to show a solid mastery of the material. You can also use the data from the missed questions to determine areas for review or reteaching.

Authors:
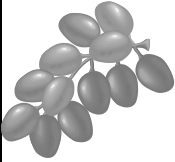
Lindsay Bauman   Noel Lopez
Sinclair Lane Elementary #248   Mt. Royal Elementary #66
Baltimore City Public School System   Baltimore City Public School System

Mixed Fruit

Organized Fruit

	IIII I
	IIII IIII I
	IIII IIII II
	IIII IIII

Chef-in-Training

Chef-in-Training

Chef-in-Training

Chef-in-Training

Chef-in-Training

Chef-in-Training

Chef-in-Training

Chef-in-Training

New Castle City

Elm Street

Main Street

Oak Street
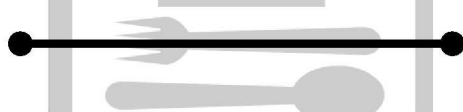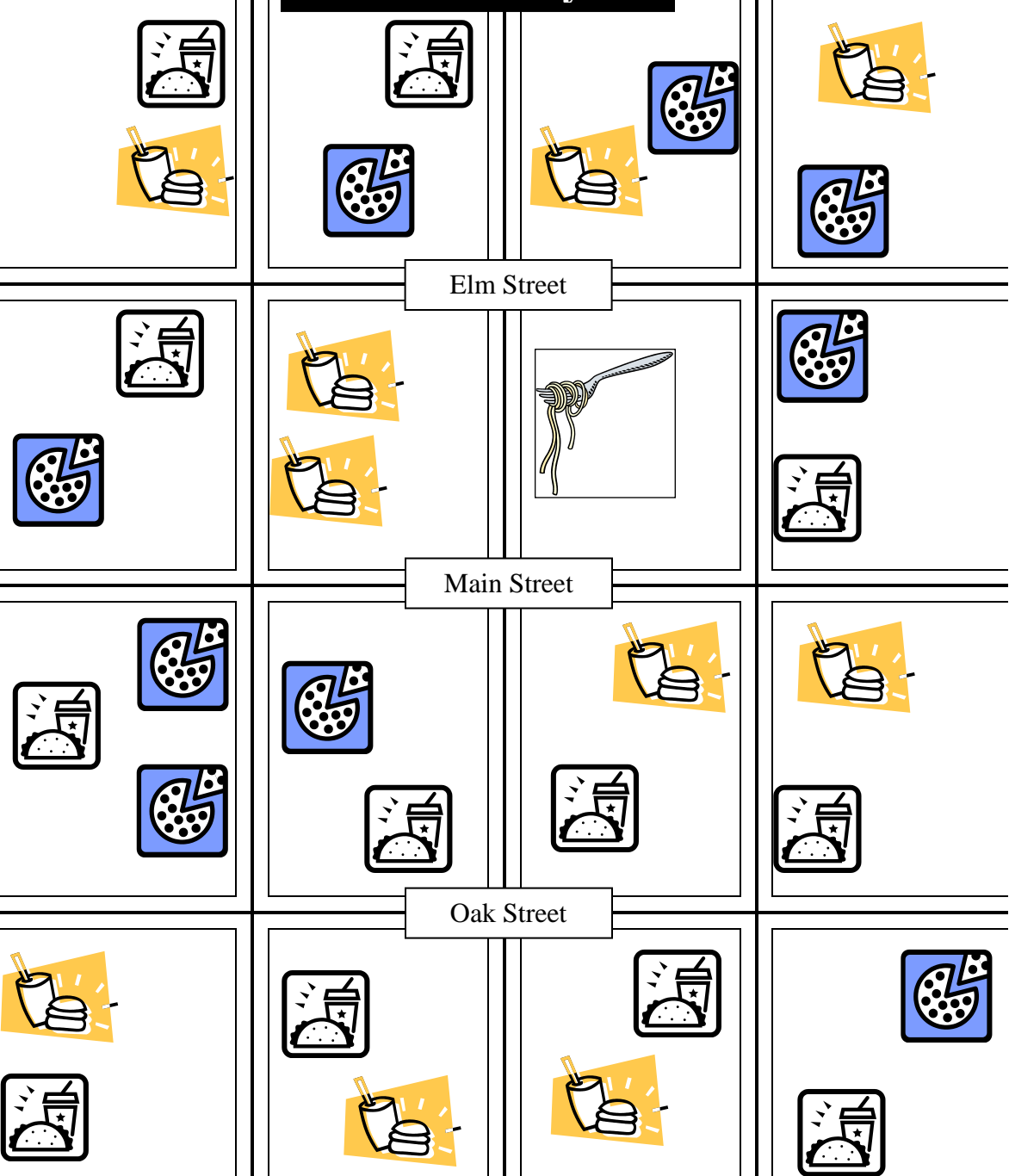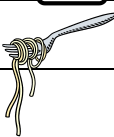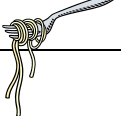
Count the number of each different restaurant by tallying their numbers below.

New Castle City Map

Elm Street

Main Street

Oak Street
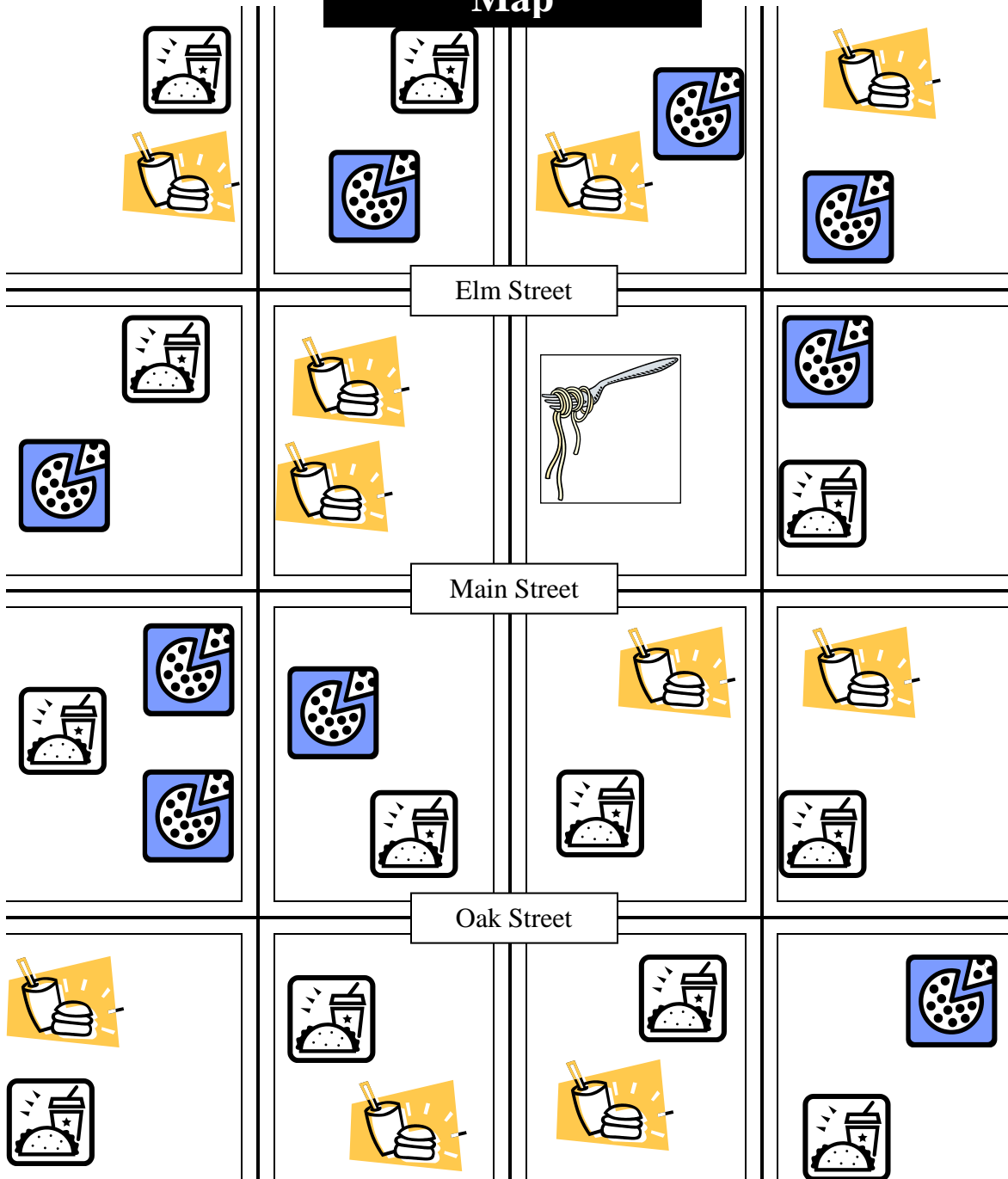
Count the number of each different restaurant by tallying their numbers below.

	10
	9
	12
	1

Scattered Supplies

Name:

Date:
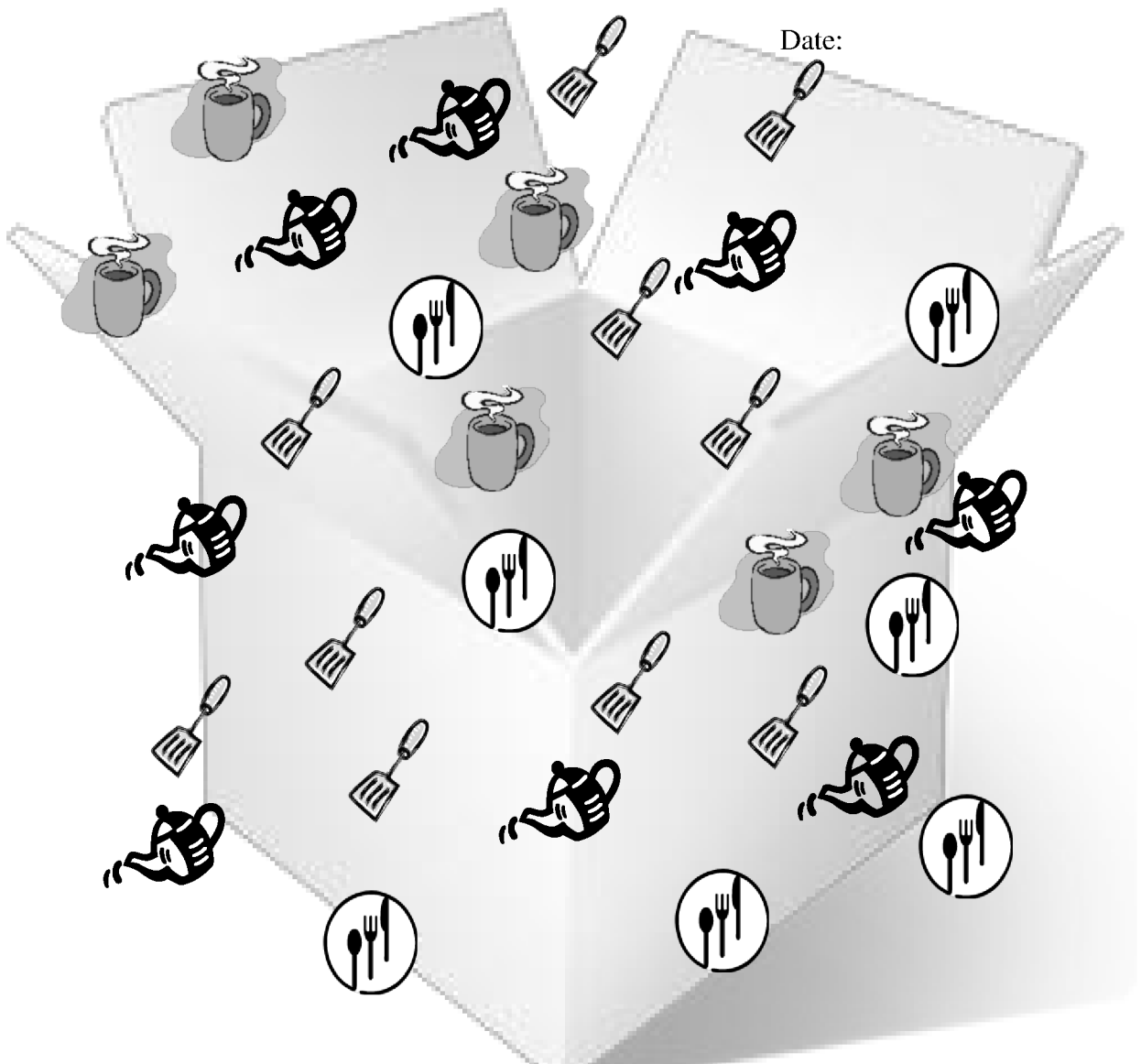
Oops, the deliveryman tripped and spilled supplies all over the kitchen floor. Please, help by tallying up the number of each spatula, pot, mug and utensil below.

Scattered Supplies
Answer Key
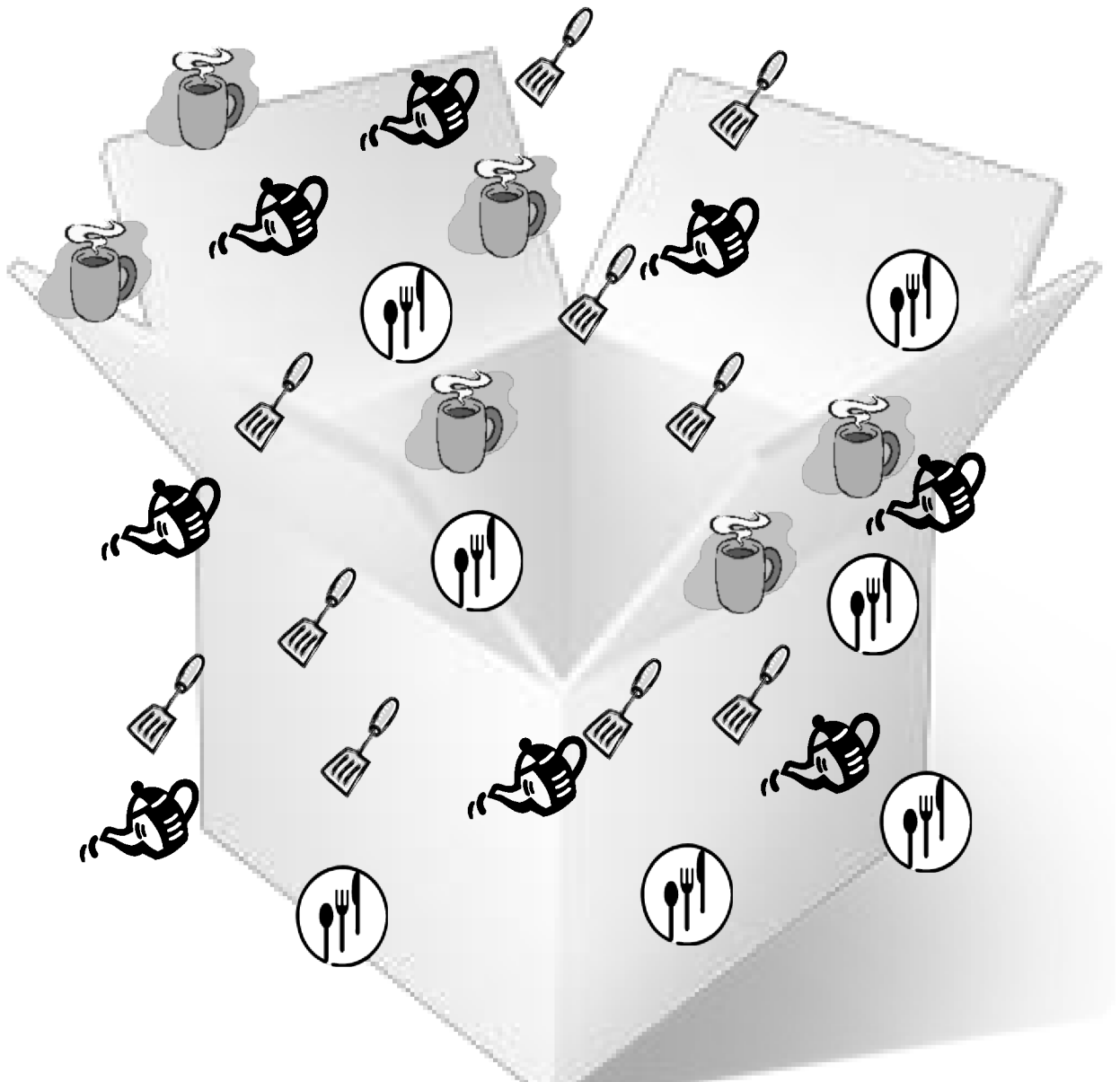
Oops, the deliveryman tripped and spilled our supplies all over the kitchen floor. Please, help by tallying up the number of each spatula, pot, mug and utensil below.

(mug)	𝍷𝍷𝍷𝍷𝍷 𝍷
(utensil)	𝍷𝍷𝍷𝍷𝍷 𝍷𝍷
(pot)	𝍷𝍷𝍷𝍷𝍷 𝍷𝍷𝍷
(spatula)	𝍷𝍷𝍷𝍷𝍷 𝍷𝍷𝍷𝍷𝍷

Exit Ticket Tally Marks   Name: Date:

Tally below the number of boys and girls in the class.

Boys	
Girls	

There are _____ girls and _____ boys in the class.

· ·

Exit Ticket Tally Marks   Name: Date:

Tally below the number of boys and girls in the class.

Boys	
Girls	

There are _____ girls and _____ boys in the class.

· ·

Exit Ticket Tally Marks   Name: Date:

Tally below the number of boys and girls in the class.

Boys	
Girls	

There are _____ girls and _____ boys in the class.

BASE TEN
TALLY SHEET

BASE TEN
TALLY SHEET

Scattered Supplies Bar Graph

Name:

Date:
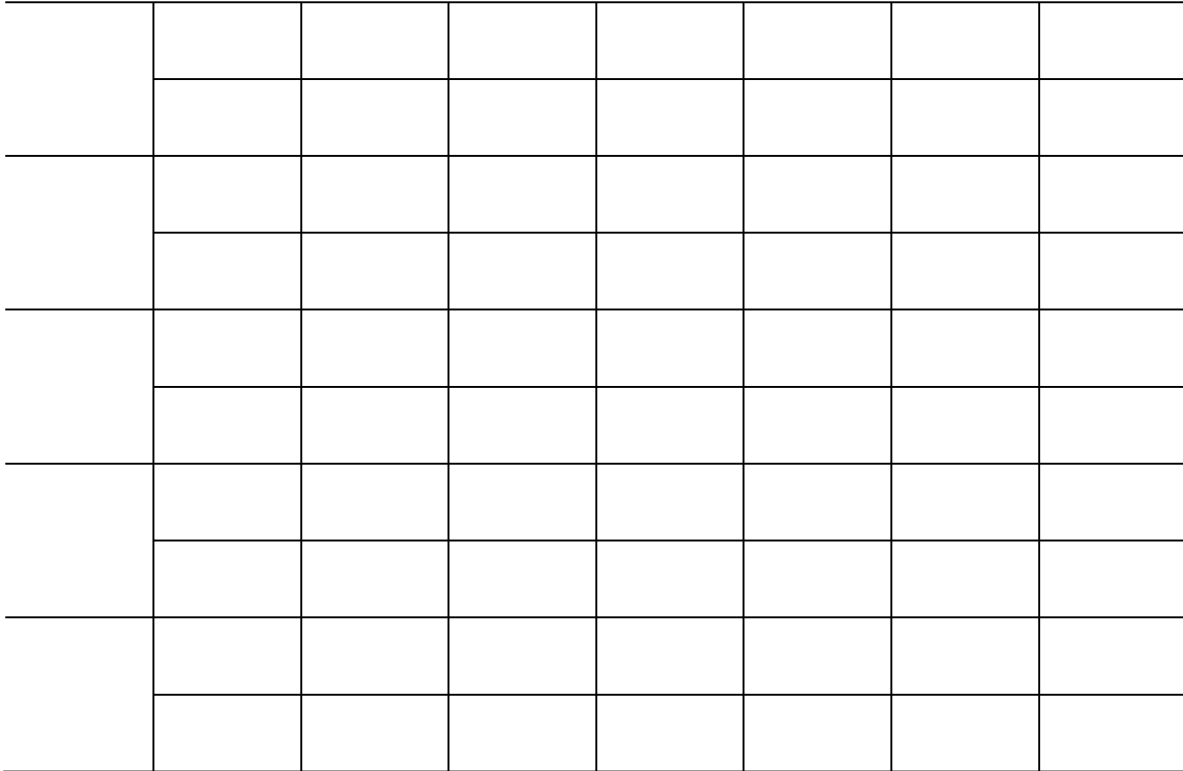
Scattered Supplies Bar Graph
Answer Key

Number of Supplies

10
8
6
4
2
0

Kitchen Supplies

Remember T.A.I.L.S.

Interval

Horizontal and Vertical **A**xis

Title

Rainfall for 2009 by city

Rainfall in Inches

14
12
10
8
6
4
2
0

Baltimore   Annapolis   Burke   Towson

Spaces

Name of Cities
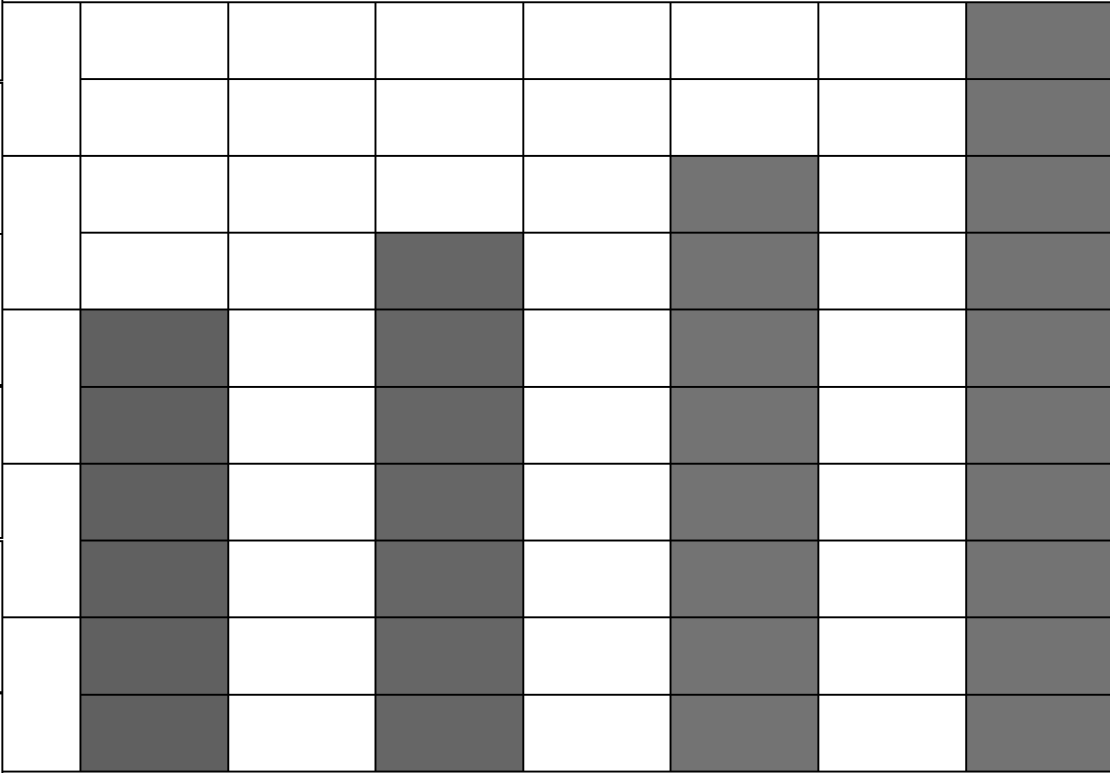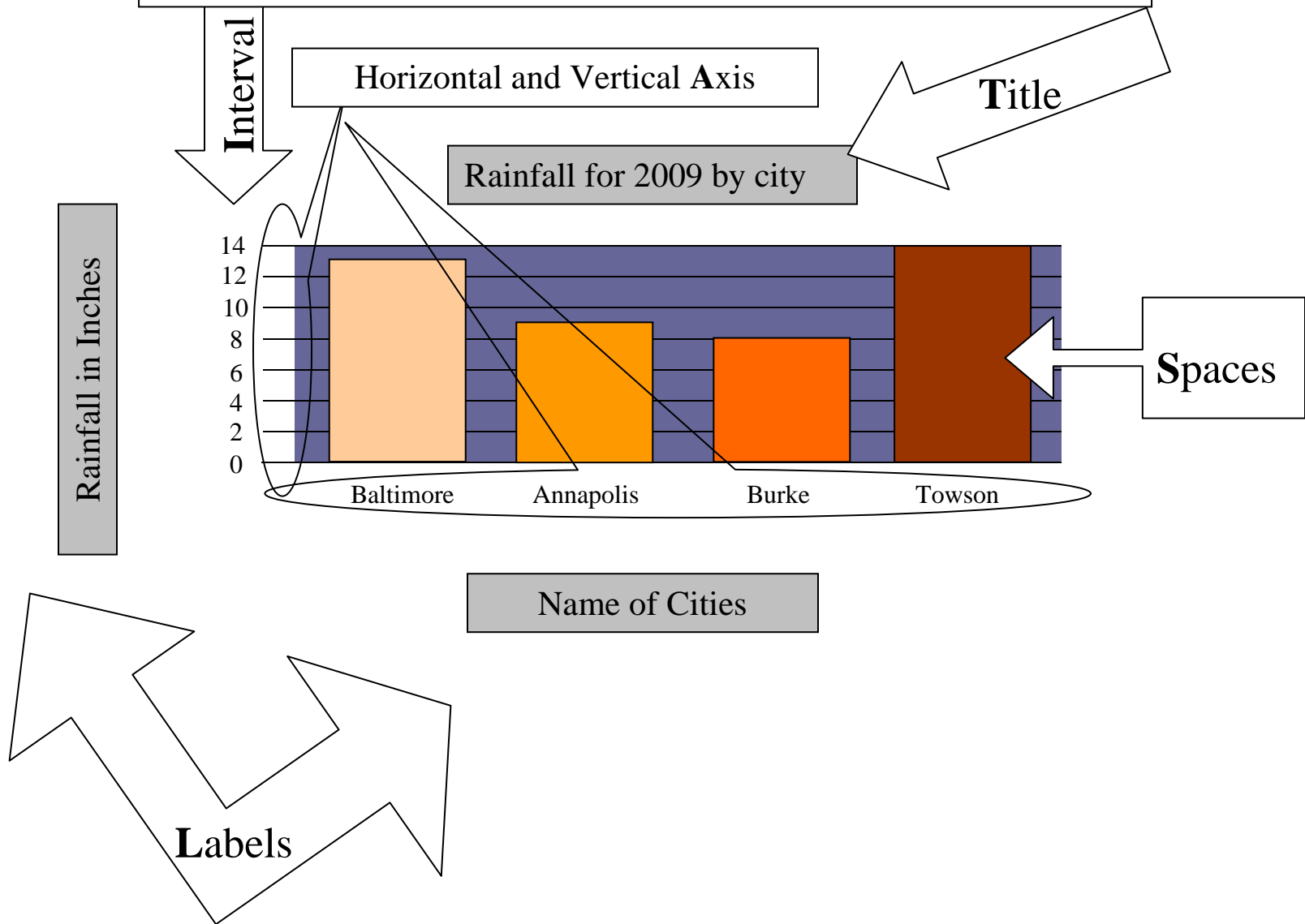
Labels

Name That Restaurant

Name:

Date:

Use the chart below to tally your class's data. Then, complete the bar graph above. Remember to use T.A.I.L.S.!! (**T**itle, **A**xis, **I**nterval, **L**abels,

SISI'S PASTA	
LOTSA PASTA	
LASAGNA LIZARD	
MORE CHEESE, PLEASE	

Exit Ticket   Name: Date:

Question: What name was picked for the restaurant? Circle your answer.

1. Sisi's Pasta   2. Lotsa Pasta

3. Lasagna Lizard   4. More Cheese, Please

How do you know this was the chosen name? Use the information from your bar graph to explain your answer. Remember to use your math vocabulary.
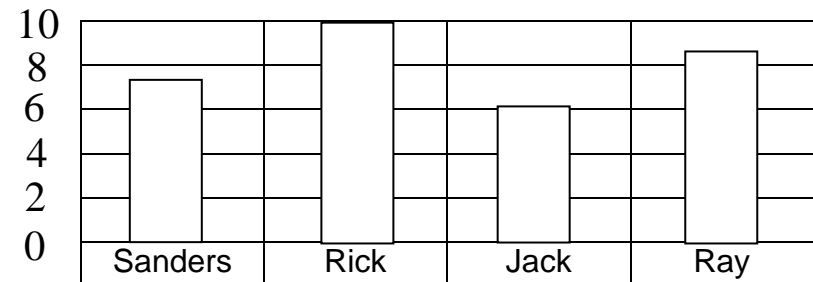
_____

_____

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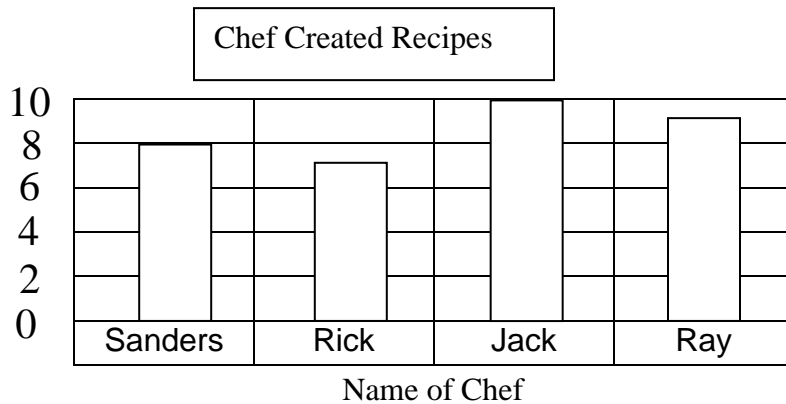
Which is Correct?

Name:

Date:

We asked four very famous chefs to create some delicious recipes to put on the menu. The chefs are, Colonel Sanders; Ranger Rick; General Jack; Captain Ray. We know how many recipes they created because of our tally sheets, but we're not sure which bar graph shows the data correctly. As chefs-in-training you need to look at the data and decide which bar graph is correct. Circle the correct bar graph.

Colonel Sanders								
Ranger Rick							
General Jack										
Captain Ray									

Chef Created Recipes

Chef Created Recipes

Chef Created Recipes

Amazing Menu

Amazing Menu
Answer Key

Name:

Name:

Date:

Use the chart below to complete the bar graph above.
Remember to use T.A.I.L.S.!! (**T**itle, **A**xis, **I**nterval, **L**abels, **S**pace)

LASAGNA	𝖧𝖧𝖳 𝖧𝖧𝖳
SPAGHETTI AND MEATBALLS	𝖧𝖧𝖳 IIII
MACARONI AND CHEESE	𝖧𝖧𝖳 𝖧𝖧𝖳 I
CHICKEN PARMESAN	𝖧𝖧𝖳

Favorite Menu Items

Number of people

12
10
8
6
4
2
0

Menu Items

Use the chart below to complete the bar graph above.
Remember to use T.A.I.L.S.!! (**T**itle, **A**xis, **I**nterval, **L**abels, **S**pace)

LASAGNA	ЖHT ЖHT
SPAGHETTI AND MEATBALLS	ЖHT IIII
MACARONI AND CHEESE	ЖHT ЖHT I
CHICKEN PARMESAN	ЖHT

Questioning a Bar Graph

"Which Is Correct?"

1. Which Chef created the greatest number of recipes?

2. Which Chef created the fewest recipes?

3. How many recipes were created in all?

4. How many more recipes did Chef General Jack create than Chef Ranger Rick?

5. What is the difference between the amount of recipes created by Chef Captain Ray and Colonel Sanders?

"Amazing Menus"

1. Which menu item received the greatest number of votes?

2. Which menu item received the fewest votes?

3. How many votes were there in all?

4. How many more votes did Macaroni and Cheese receive than Chicken Parmesan?

5. What is the difference between the amount of votes for Lasagna and Spaghetti and Meatballs?

Questioning a Bar Graph
Answer Key

"Which Is Correct?"

1. Which Chef created the greatest number of recipes?
   General Jack

2. Which Chef created the fewest recipes?

   Ranger Rick
3. How many recipes were created in all?
   8+7+10+9=34

4. How many more recipes did Chef General Jack create than Chef Ranger Rick?
   10-7=3

5. What is the difference between the amount of recipes created by Chef Captain Ray and Colonel Sanders?
   9-8=1

"Amazing Menus"

1. Which menu item received the greatest number of votes?
   Macaroni and Cheese

2. Which menu item received the fewest votes?

   Chicken Parmesan
3. How many votes were there in all?
   10+9+11+5=35

4. How many more votes did Macaroni and Cheese receive than Chicken Parmesan?
   11-5=6

5. What is the difference between the amount of votes for Lasagna and Spaghetti and Meatballs?
   10-9=1

Name: Date

Business Proposal

Setting the Table

As Chefs-in-Training, before the restaurant can open, you need to set the tables. Please count up the number of items that you have and record the information on the tally chart below.
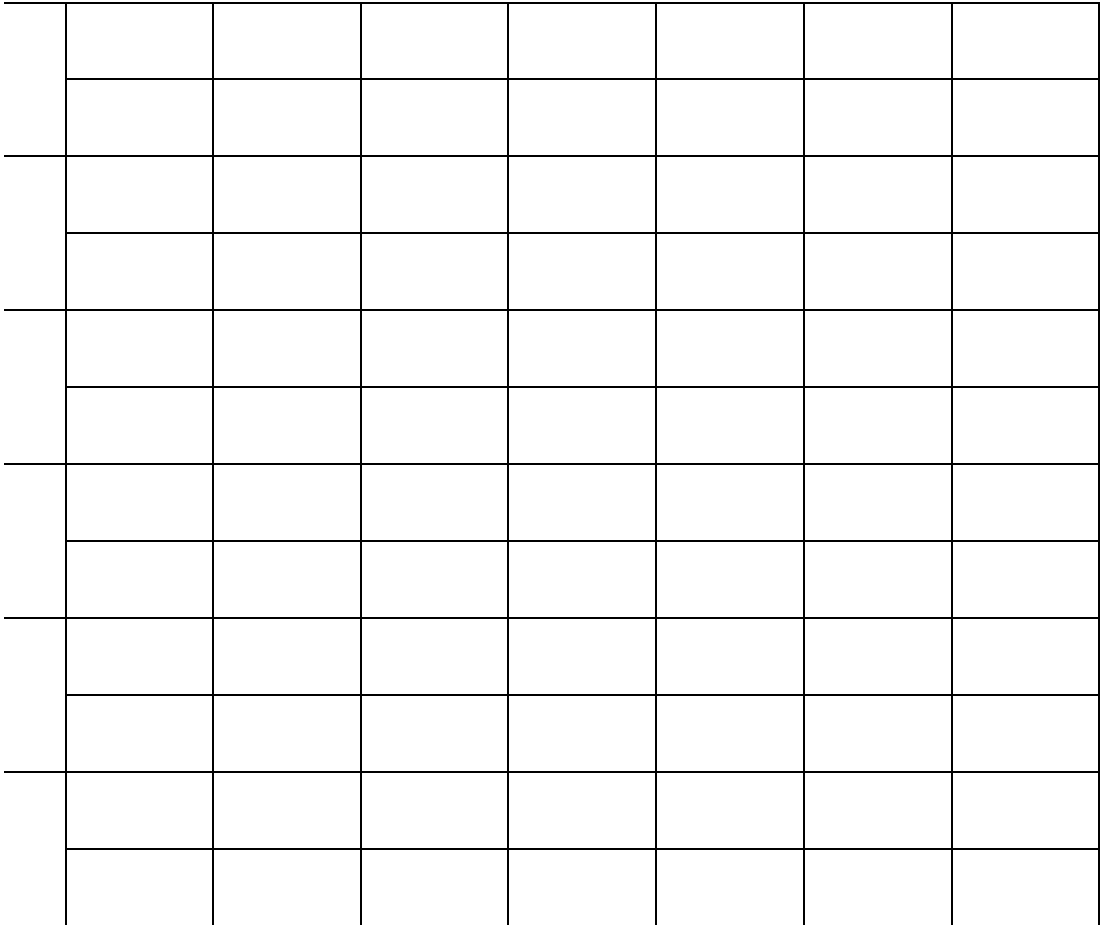
Question #1

Business Proposal

Question #2
Use the tally chart to fill out the bar graph below. Remember to use
T.A.I.L.S.!! (**T**itle, **A**xis, **I**nterval, **L**abels, **S**pace)

Business Proposal

Using the information from the previous bar graph, answer the following questions.

Question #3

Which item do you have the most of?

Ⓐ Chairs   Ⓒ Tables

Ⓑ Bread   Ⓓ Flowers

Question #4

Which item do you have the least of?

Ⓐ Chairs   Ⓒ Tables

Ⓑ Bread   Ⓓ Flowers

Question #5

How many more flowers are there than loaves of bread?

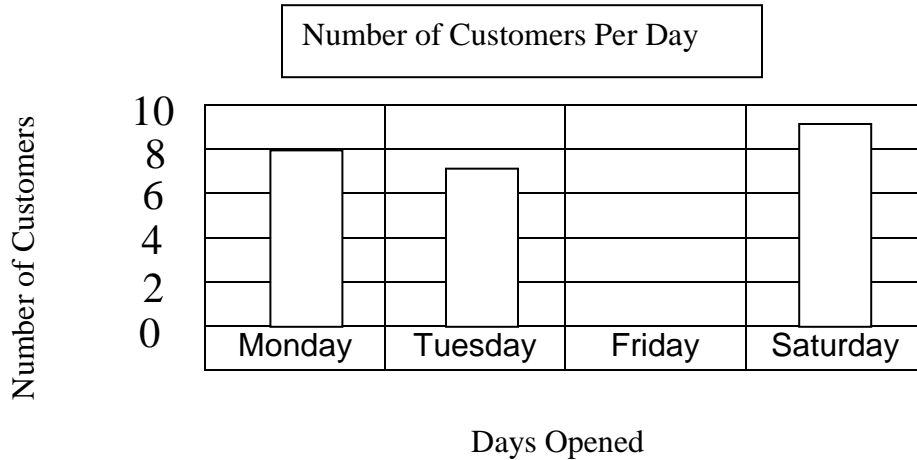_____

Question #6

How many fewer tables are there than chairs?

_____

Question #7

How many items were counted in all?

_____

Congratulations!! You are now the proud owners of your very own restaurant. This bar graph shows the number of customers you had the first week you opened.

Question # 8

Number of Customers Per Day

Number of Customers

10
8
6
4
2
0

Monday   Tuesday   Friday   Saturday

Days Opened

A. Friday had the most customers. Fill in the bar graph for Friday showing that it had the most customers.

_____

B. Use what you know about bar graphs to explain why your answer is correct. Use words, numbers and/or symbols in your explanation.

_____

_____

_____

_____

_____

Name: Date

Business Proposal
Answer Key

Setting the Table

As Chefs-in-Training, before the restaurant can open, you need to set the tables. Please count up the number of items that you have and record the information on the tally chart below.
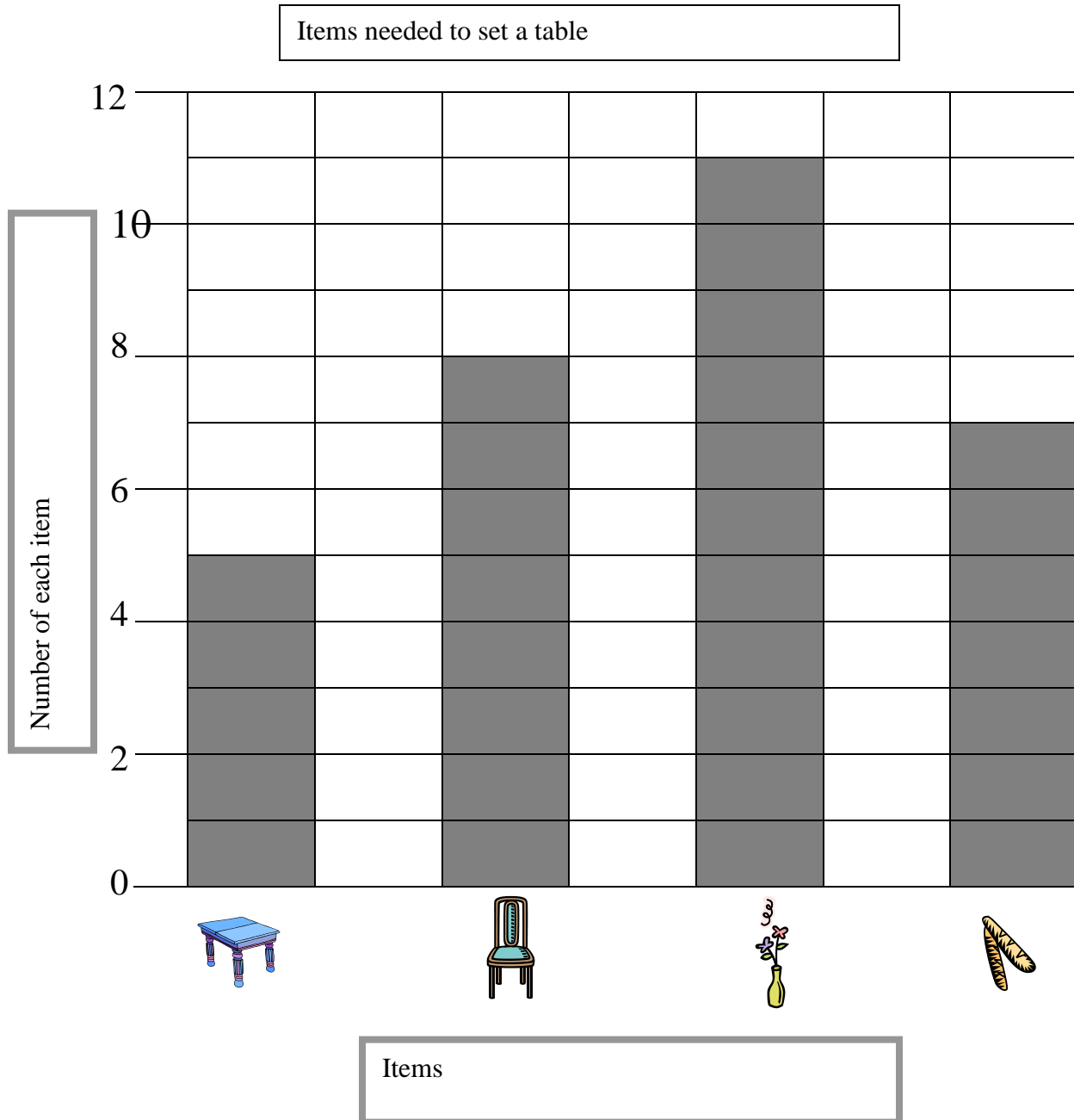
Question #1

	卌
	卌 |||
	卌 卌|
	卌 ||

Question #2

Use the tally chart to fill out the bar graph below. Remember to use
T.A.I.L.S.!! (**T**itle, **A**xis, **I**nterval, **L**abels, **S**pace)

Items needed to set a table

Number of each item

Items

Business Proposal
Answer Key

Using the information from the previous bar graph, answer the following questions.

Question #3

Which item do we have the most of?

Ⓐ Chairs   Ⓒ Tables

Ⓑ Bread   Ⓓ Flowers

Question #4

Which item do we have the least of?

Ⓐ Chairs   Ⓒ Tables

Ⓑ Bread   Ⓓ Flowers

Question #5

How many more flowers are there than loaves of bread?

11-7=4

Question #6

How many fewer tables are there than chairs?

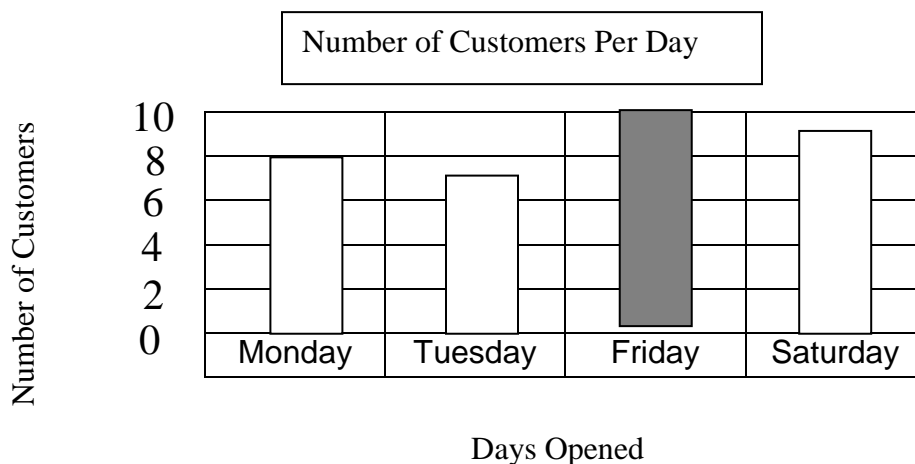8-5=3

Question #7

How many items were counted in all?

5+8+11+7=31

Business Proposal
Answer Key

Congratulations!! You are now the proud owners of your very own restaurant. This bar graph shows the number of customers you had the first week you opened.

Question # 8

Number of Customers Per Day

Days Opened

A. Friday had the most customers. Fill in the bar graph for Friday showing that it had the most customers.

B. Use what you know about bar graphs to explain why your answer is correct. Use words, numbers and/or symbols in your explanation.

Exemplary Answer:

I know that that bar graphs show information. Saturday had 9 customers, which was the most. So Friday must have had more than 9. I know that the more of something you have, the higher the bar is. So, I made Friday's bar show 10 customers.